Remarks

This is responsive to the Office Action mailed September 16, 2004.

Claims 2-24, 28 and 47-49 have been canceled. Claim 1 has been amended. New claims 52 and 53 have been added. As a result, claims 1, 52 and 53 are pending for examination, with claim 1 being the sole independent claim. No new matter has been added.

The specification has been amended to correct typographical errors. Recitation of "Table 7" has been corrected to "Table 8" where appropriate. Table 1 has been corrected to correct a typographical error in one of the Upper Limit values; the corrected value was recited in original Table 1 in the PCT application. No new matter has been added.

The Examiner indicated that reference C7 was not found in the application file. Applicant encloses herewith another copy of this reference, and respectfully requests consideration if it by the Examiner.

Objection to the Specification

The Examiner objected to the specification on the basis that the several recitations were incorrect. Applicant has submitted amended paragraphs of the specification in order to correct the typographical errors in the references to Table 7. Those locations in the specification referring to structure coordinates have been corrected to refer to Table 8.

Rejections Under 35 U.S.C. § 112, Second Paragraph

[a] Recitation of claim steps

The Examiner rejected claims 1-8, 12-17 and 19-22 as indefinite for not reciting steps involved in the claimed process. Applicant has amended claim 1 and canceled all other claims. Amended claim 1 does recite method steps and therefore this rejection should no longer apply.

[b] Clarity of claim terms

The Examiner rejected claims 1-8, 12-17 and 19-22 as indefinite for the recitation of "active site, an accessory binding site or a pocket of an RRF protein". Applicant was asked to clarify the claim terms. Applicant provides the following clarification.

1) active site

The portion of the RRF molecule that plays a key role for its function, disassembly of the post-termination ribosomal complex. These sites include but not limited to following regions:

(a) A site with which RRF binds to the ribosomal RNA

Arginine at the position 132 and 129 is known to be responsible for ribosomal binding to ribosomal RNA (helix 71 and 69 of 23S RNA of 50S subunit).

(b) A hinge region of domain II and I

It is known that the flexibility of RRF is essential for the activity (see reference C3 (Selmer et al., 1999) in Form PTO-1449; see also Toyoda et al., 2000, and Yoshida et al, 2001, both of which are cited in an Information Disclosure Statement filed herewith). The flexibility comes from the hinge region.

(c) A part which is responsible for interaction with another factor, EF-G (elongation factor G)

It is known that RRF interacts with EF-G at the hinge region. This part is known from recent studies with cryo-electron microscopy (see Agrawal et al., 2004, cited in an Information Disclosure Statement filed herewith).

2) accessory binding site

One of the above mentioned binding sites is "accessory" in a sense that it does not play a major role but influences the RRF activity because of the influence of that site on the structure of RRF as a whole. In other words, some of the above-mentioned interaction site may influence the entire structure of the RRF molecule upon binding to either ribosome or EF-G even though they do not play a major role for the binding per se.

3) pocket

There are a number of "holes" in the RRF molecule that can accommodate small molecules. These are called pockets. For example, detergent has been shown to go into the hole in between two domains (see Kim et al., 2000, cited in an Information Disclosure Statement filed herewith). Such holes are important for designing anti-RRF drugs because small molecules (i.e., drugs) can be designed to have a strong affinity to these pockets and such drugs will stay bound and influence the activity of RRF.

[c] Recitation of "computationally evaluating"

The Examiner indicated that it was unclear as to how the computational evaluation is carried out. This term is not present in claim 1 as amended, and therefore the rejection as based on this term is moot.

[d] Recitation of "chemical entity of RRF protein"

Applicant's amendment of claim 1 has deleted this term, obviating this portion of the rejection.

[e] Recitation of "RRF protein"

As noted in the amended claim, an RRF protein is a ribosomal recycling factor protein. RRF proteins have the activity of disassembling the post-termination ribosomal complex into mRNA, tRNA and ribosome, and should have structure similar or identical to the structure described in this patent.

[f] Recitation of "the RRF protein itself"

Claims 2 and 14 have been deleted, rendering this rejection moot.

[g] Recitation of "Table 7"

Claims 7 and 22 have been deleted, rendering this rejection moot.

[h] Recitation of "derived from"

Claims 8 and 12 have been deleted, rendering this rejection moot.

[i] Recitation of "reaction of a compound"

Claim 15 has been deleted, rendering this rejection moot.

[j] Recitation of "compound characterized by the chemical entity bound to the active site"

Claim 19 has been deleted, rendering this rejection moot.

Accordingly, in view of the amendment of the claims and the arguments presented above, Applicant respectfully requests that the Examiner reconsider and withdraw the rejections of the claims under 35 U.S.C. § 112, second paragraph.

Rejections Under 35 U.S.C. § 101

The Examiner rejected claims 1-8, 12-17 and 19-22 under 35 U.S.C. § 101 as lacking either a specific and substantial asserted utility or a well-established utility. Applicant respectfully traverses the rejection.

RRF protein is an essential protein and hence any inhibitor of RRF functions as an antibiotic. In a published paper, we have shown that the loss of RRF is bactericidal (see C32 (Janosi et al., 1998) in Form PTO-1449). Accordingly, the present invention as set forth in the claims clearly has a well-established utility as required under 35 U.S.C. § 101.

Further, Applicant has set forth a specific and substantial utility in the specification. Two examples of statements of utility in the specification follow, but there are many additional examples. On the first page of the specification, Applicant stated that: "... the present invention relates to the determination of the structure of RRF mutants, homologues and so forth and technology for the development of bactericides, fungicides and herbicides...." At the bottom of page 6, Applicant stated: "...once the steric structure of a protein is discovered, it is possible to create a substance that can serve as a ligand thereof and in this sense, in order to create a useful antibiotic...." Therefore, Applicant has set forth a specific and substantial asserted utility.

Accordingly, Applicant respectfully requests that the Examiner withdraw the rejection of the claims made under 35 U.S.C. § 101.

Rejections Under 35 U.S.C. § 112, First Paragraph

(a) The Examiner rejected claims 1-8, 12-17 and 19-22 as failing to comply with the written description requirement. In particular, the Examiner indicated that the claims were drawn to a method for designing a compound capable of binding to a genus of RRF proteins, and that a sufficient description of a representative number of species or relevant identifying characteristics had not been provided.

Applicant has amended the claims to now recite structural coordinates, which are known to one of ordinary skill in the art as identifying the structure of a protein. By providing and reciting in the claim the structural coordinates of the RRF protein, Applicant has provided a description that one of ordinary skill in the art recognizes as defining the protein used in the claimed method.

(b) The Examiner rejected claims 1-8, 12-17 and 19-22 as failing to comply with the enablement requirement. Applicant has amended the claims such that the claims recite specific coordinates that, in combination with the teachings of the specification, enable one of ordinary skill in the art to practice the claimed invention.

Applicant notes that the claim as now amended uses similar language as that issued in US patent 5,856,116, in which a three-dimensional structure of an interleukin-1β converting enzyme (ICE) is set forth. The claimed method can easily be carried out by a person skilled in the art in view of Applicant's disclosure of the atomic coordinates of RRF protein according to Table 8.

Accordingly, in view of the amendment of the claims and the arguments presented above, Applicant respectfully requests that the Examiner reconsider and withdraw the rejections of the claims under 35 U.S.C. § 112, first paragraph.

CONCLUSION

In view of the foregoing amendments and remarks, this application should now be in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to call the Applicant's attorney at the telephone number listed below.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Respectfully submitted,
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